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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,131	02/06/2004	Jorg Freudenberger	P03,0608	8391

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EXAMINER

ARTMAN, THOMAS R

ART UNIT	PAPER NUMBER
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2882

DATE MAILED: 07/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/774,131

Applicant(s)

FREUDENBERGER ET AL.

Examiner

Thomas R. Artman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8 and 16 is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4 and 9-12 are rejected under 35 U.S.C. 102(e) as being anticipated by
Donnelly (US 2005/0129169 A1).

Regarding claims 1 and 9, Donnelly discloses a monochromator (Fig.2), including:

a) a crystal 13 having a property of spectrally restricting X-rays to a spectral range having a spectral composition exceeding a spectral range provided by Bragg's Law (imperfect crystals, par.0016, lines 40-42; par.0025, lines 25-27), and

b) a positioning device 12 connected to the crystal to move the crystal relative to X-rays emitted by an X-ray radiator to change the spectral composition of the X-rays.

With respect to claims 2 and 10, Donnelly further discloses that the positioning device moves the crystal to alter an angle between at least a portion of the X-rays and the crystal (par.0018, lines 19-23).

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With respect to claims 3 and 11, Donnelly further discloses that the positioning device moves the crystal into and out of a path of X-rays (par.0018, lines 19-23).

With respect to claims 4 and 12, Donnelly further discloses a control device 6 connected to the positioning device for automatically controlling the positioning device to control movement of the crystal.

Claims 1, 2, 4-6, 9, 10, and 12-14 are rejected under 35 U.S.C. 102(b) as being anticipated by Carroll (US 6,327,335 B1).

Regarding claims 1 and 9, Carroll discloses a monochromator (Figs.1 and 8), including:

- a) spectrally restricting X-rays to a spectral range having a spectral composition exceeding a spectral range provided by Bragg's Law (mosaic crystals, see at least Abstract), and
- b) a positioning device connected to the crystal to move the crystal relative to X-rays emitted by an X-ray radiator to change the spectral composition of the X-rays (col.4, lines 36-57).

With respect to claims 2 and 10, Carroll further discloses that the positioning device moves the crystal to alter an angle between at least a portion of the X-rays and the crystal (colo.4, lines 36-44 and 55-57).

With respect to claims 4 and 12, Carroll further discloses a control device for automatically controlling the positioning device to control movement of the crystal (col.9, lines 53-65).

With respect to claims 5 and 13, Carroll further discloses that the crystal spectrally restricts X-rays, where the restricted X-rays have an energy spectrum with a maximum value, and the control device allows the setting of the maximum value (14 and 18 keV, col.4, lines 58-64).

With respect to claims 6 and 14, Carroll further discloses that the X-rays emitted by the radiator have an energy spectrum with a first maximum value, and the crystal spectrally restricts the X-rays at a second maximum value, where the control device allows the setting of the factor between the first and second maximum values and controls the positioning device dependent upon the set factor (a factor less than or equal to 1, since a fixed, white light source is used and the crystals select the energy range, col.4, lines 36-44 and 58-64).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carroll, as applied to claims 6 and 14 above, respectfully.

Carroll does not specifically disclose setting a factor of 0.3 to 0.8 between the first and second energy maxima. As stated above, Carroll suggests a factor less than or equal to 1, since the white light source must have an energy equal to or higher than the energies desired for selection by the crystal 42 (the example being 14 keV and 18 keV, col.4, lines 58-64). However, since the energy of the “white” X-ray source is not specified, then the actual factor between the maximum energies selected by the crystal is not fully known, but it must be more than 18 keV, in the example where energies of 14 and 18 keV are selected.

Carroll does state that the monochromator can be tuned to select a broad range of desirable energies from an incident X-ray beam (col.4, lines 58-64). Further, such selectivity is useful when performing dual-energy contrast imaging by choosing energies that will selectively image desired tissues distinguishable from other tissues (col.1, lines 19-20 and col.58-64). Carroll provides the example of tumor tissue and healthy breast tissue, and the disclosure cited above specifically teaches that the energies are selected based upon the anatomy that needs to be imaged. It is also clear to one skilled in the art that the disclosure is not limiting to tumor and

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healthy tissues, as such are provided as an example (col.1, lines 19-20). Thus, it is known to one skilled in the art to select the appropriate energy(ies) for the specific tissues to be imaged in the object being examined for accurate imaging and diagnostics, as taught by Carroll.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the select the appropriate energies (factor between maximum energy output and maximum energy passed through the crystal) for the specific tissues of interest for maximizing the quality of the image of the anatomy of interest, as taught by Carroll.

Allowable Subject Matter

Claims 8 and 16 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: the prior art of record neither teaches nor reasonably suggests a monochromator having a control device that automatically controls a positioning device to move a crystal with respect to a beam of X-rays in order to change the spectral composition of the X-rays dependent upon a change in an operating voltage of the source, where the crystal has a property of spectrally restricting X-rays to a spectral range having a spectral composition exceeding a spectral range provided by Bragg's Law, as required by the combination as claimed in each of claims 8 and 16.

The best prior art of record, Zhong (US 6,038,285), teaches the adjustment of the deflection voltage of the X-ray source and adjusting the angle of the crystal with respect to the source accordingly; however, the crystals are "pure" crystals, providing a very narrow spectrum according to Bragg's Law.

Carroll teaches the use of mosaic crystals which provide spectra broader than that of “pure” crystals; however, there is no adjustment of the source needed since either a fixed monochromatic source (FEL) is used or a fixed “white light” X-ray source is used, with the mosaic crystals providing the necessary spectral selectivity.

Response to Arguments

Applicant's arguments with respect to claims 1 and 9 as being anticipated by Zhong (US 6,038,285) have been considered but are moot in view of the new ground(s) of rejection.

Applicant's arguments with respect to claims 1 and 9 as being anticipated by Donnelly have been fully considered but they are not persuasive. Applicants assert that Donnelly does not use crystals having the spectral characteristics as claimed in amended claims 1 and 9. The examiner respectfully disagrees.

As can be seen from the citations of Donnelly stated in the corresponding rejections above, Donnelly clearly discloses the practice of using “imperfect crystals” as well as “pure” or “perfect” crystals for the monochromator. Imperfect crystals will not perfectly monochromatize an incident beam according to Bragg's Law, thus providing a wider spectrum as claimed. Furthermore, “imperfect crystals” is a term often used in the art for mosaic crystals, which deliberately have an imperfect crystal structure that spectrally restrict X-rays more broadly than the perfect crystals described previously.

Therefore, Applicants' arguments are not persuasive, and the 35 USC 102(e) rejections of claims 1-4 and 9-12 over Donnelly are being maintained.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485. The examiner can normally be reached on 9am - 5:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Thomas R. Artman
Patent Examiner

TR Artman 7/2/06

Edward J. Glick
EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER